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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,544	08/15/2003	Hans-Ludwig Althaus	M&N-IT-474	1984

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LERNER AND GREENBERG, PA
P O BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER	
VAN ROY, TOD THOMAS	
ART UNIT	**PAPER NUMBER**
2828	

DATE MAILED: 12/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 10/642,544	Applicant(s) ALTHAUS ET AL.
	Examiner Tod T. Van Roy	Art Unit 2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 17-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 17-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

The drawings were received on 10/19/2005. These drawings are acceptable.

Response to Amendment

The examiner acknowledges the amending of claims 1, 17-18, 25, and 30, as well as the cancellation of claims 15-16, and 33-34.

Response to Arguments

Applicant's arguments with respect to claims 1 and 25 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 4-6, 8, 10-14, 17-18, 21-22, 24, 25, 27, 28, and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US 6580734) in view of Anthon (US 6125222).

With respect to claim 1, Zimmermann teaches a laser module for optical transmission systems (fig.5) comprising a laser diode (fig.9 #83, col.7 lines-54-55) emitting light at an emitted output wavelength, an optical resonator connected to said laser diode (col.2 lines 21-24) and having a reflective mirror surface (col.2 line 22) and an adjustable effective optical path length (col.2-3 lines 66-2, fig.5 #86) and a photon density as a function of the effective optical path length (an inherent feature in the system since the laser diode is outputting an amount of light intensity into the cavity region), an optical waveguide having a Bragg grating receiving the light from the laser diode (fig.5 #98,96), and a stabilizer stabilizing the emitted output wavelength (col.4 lines 48-52), and a measurement apparatus for measuring the photon density within said resonator (fig.5 #91), an adjustment apparatus for adjusting the effective optical path length of said resonator (col.2-3 lines 66-2, fig.5 #86), and a control apparatus comparing the effective optical path lengths of said resonator and producing control commands to said

adjustment apparatus in order to adjust the effective optical path length of said resonator to equal the emitted output wavelength to a desired wavelength (col.8 lines 53-64), and coupling optics coupling said laser diode to said Bragg grating, said optics of an aspherical shape (fig.5 #94). Zimmermann does not teach the optics to be separated from the waveguide. Anthon teaches an external cavity laser utilizing lenses that are spatially separated from the waveguide (fig.1). It would have been obvious to one of ordinary skill at the time of the invention to combine the laser module of Zimmermann with the separated lenses of Anthon in order to enable easier adjustment of the lenses with the diode, without moving the waveguide, as well as the ability to replace, or repair, an existing lens without the need to replace the waveguide.

With respect to claim 2, Zimmermann additionally teaches the reflective mirror surface of said optical resonator is highly reflective (col.2 lines 21-22, wherein it is inherent that the back facet of the laser diode is highly reflective in order to provide sufficient feedback of the light into the cavity to form the described resonator).

With respect to claims 4 and 5, additionally teaches the adjustment apparatus to have a thermal regulating device for said laser diode, which heats the diode (fig.5 #86, col.8 lines 45-48).

With respect to claim 6, Zimmermann additionally teaches a thermal regulating device for cooling the diode (fig.9 #120).

With respect to claim 8, additionally teaches the measurement apparatus to have a monitor diode disposed adjacent to said highly reflective mirror surface of said optical

resonator and detecting light output from said resonator by said mirror surface (fig.5 #91).

With respect to claim 10, Zimmermann additionally teaches the control apparatus is part of a control loop regulating the emitted output wavelength of the laser module at the desired wavelength, with the photon density being measured iteratively and said control apparatus emitting a control command to said adjustment apparatus for adjusting the effective optical path length of said resonator (col.8 lines 53-64) based on a difference between two successive measurements (col.11 lines 31-45, wherein the process of calculating the slope may be done by utilizing the difference between two successive measurements with the well known formula (y2-y1)/(x2-x1)).

With respect to claim 11, Zimmermann additionally teaches said laser diode to form a Fabry-Perot semiconductor laser (col.7 lines 54-56, wherein a Fabry-Perot type laser is well known to be an industry standard diode laser used in external cavity modules) having a facet formed by said highly reflective mirror surface of said optical resonator (col.2 lines 21-22, wherein it is inherent that the back facet of the laser diode is highly reflective in order to provide sufficient feedback of the light into the cavity to form the described resonator).

While not relied upon in this rejection, Kapany et al. (US 6480513, note col.5 lines 25-30) further speaks of the prominent usage of Fabry-Perot type laser diodes in external cavity modules.

With respect to claim 12, Zimmermann additionally teaches the front facet of the Fabry-Perot laser diode to include an anti-reflection coating (col.7 lines 55-56).

With respect to claims 13 and 14, Zimmermann additionally teaches the Bragg grating to have a central wavelength (col.8 lines 12-14) and that the control apparatus controls the adjustment apparatus to approach, and eventually equal, the central wavelength of said Bragg grating (col.8 lines 61-64).

With respect to claim 17, Zimmermann teaches the laser module outlined in the rejection to claim 15, but does not teach the coupling optics to have a reflection coating. Anthon teaches an external cavity laser utilizing lenses that are antireflection coated (col.4 lines 56-57). It would have been obvious to one of ordinary skill at the time of the invention to combine the laser module of Zimmermann with the antireflection coated lenses of Anthon in order to prevent unwanted interference due to similarly unwanted reflections.

With respect to claim 18, Zimmermann teaches the laser module outlined in the rejection to claim 1, wherein it is inherent that the coupling optics are slightly inclined. (since the optics are directly connected to the fiber, and the fiber system is constantly being thermally adjusted by the heating element, it is inherent that the pitch of both the fiber and lens will be changed such that they are slightly inclined with respect to the laser diode)

While not relied upon in this rejection, Kapany et al. (US 6480513, note col.3 lines 62-67) further speaks of the inherent change in pitch due to thermal effects in the fiber system.

With respect to claim 21, Zimmermann teaches the laser module outlined in the rejection to claim 1, but does not teach the end of the fiber to be slightly inclined. Anthon

teaches an external cavity laser wherein the end of an optical fiber is slightly inclined (col.5 lines 5-7). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser module of Zimmermann with the inclined fiber of Anthon in order avoid any unwanted back reflections (Anthon, col.5 lines 6-7).

With respect to claim 22, Zimmermann additionally teaches the Bragg grating is immediately adjacent said laser diode (fig.5 #94,89).

With respect to claim 24, Zimmermann additionally teaches the control apparatus to emit a control command to said adjustment apparatus (col.8 lines 53-64) based on an internal calculation to change the effective optical path length of said resonator by an amount depending on a comparison between different values of the photon density at different optical path lengths of said resonator (col.11 lines 31-45, wherein the process of calculating the slope may be done by utilizing the difference between two successive measurements with the well known formula (y2-y1)/(x2-x1)).

Claim 25 is rejected for the same reason as claim 1. These claims merely detail the methods of process flow for the module. The method of process flow for a device is not germane to the patentability of the device itself, therefore these limitations are not given patentable weight. At best these claims could be characterized as product-by-process claims, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the structure of claims 1 and 10.

With respect to claim 27, Zimmermann additionally teaches repeating the steps until the emitted wavelength equals a central wavelength of the Bragg grating (col.8 lines 61-64).

With respect to claim 28, Zimmermann additionally teaches the measuring to utilize a monitor diode (fig.5 #91).

With respect to claim 30, Zimmermann additionally teaches adjusting the optical path length by externally changing the temperature of the diode (col.8 lines 45-47).

With respect to claim 31, Zimmermann additionally teaches the comparison of the measured photon densities to be carried out by subtraction (col.11 lines 31-45, wherein the process of calculating the slope may be done by utilizing the difference between two successive measurements with the well known formula (y2-y1)/(x2-x1)).

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann in view of Tomlinson et al. (US 2003/0035449).

With respect to claim 3, Zimmermann teaches the laser module outlined in the rejection to claim 1 including an adjustment apparatus. Zimmermann does not teach the adjustment apparatus to be a device for longitudinal movement of said optical waveguide. Tomlinson teaches a device for longitudinal movement in an external cavity laser system ([0033], use of piezoelectric stages). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser module of Zimmermann with the movement device of Tomlinson to effectively control the detuning of the module (Tomlinson [0033]).

With respect to claim 7, Zimmermann teaches the laser module outlined in the rejection to claim 1, but does not teach the adjustment apparatus to have a device for varying an operating current of the laser diode. Tomlinson teaches a device for varying an operating current of the laser diode ([0031]). It would have been obvious at the time of the invention to combine the laser module of Zimmermann with the current varying device of Tomlinson to provide constant output power to the device (Tomlinson [0031]).

Claims 9, 23, 29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann in view of Daiber et al. (US 2003/0012239).

With respect to claim 9, Zimmermann teaches the laser module outlined in the rejection to claim 1, but does not teach the measurement apparatus to have a detector for detecting a voltage across said laser diode when the operating current is constant. Daiber teaches an external cavity laser which utilizes a voltage monitor across the gain region ([0006]). It would have been obvious at the time of the invention to combine the laser module of Zimmermann with the voltage monitor of Daiber in order to monitor loss elements outside of the gain region (Daiber [0006]).

With respect to claim 23, Zimmermann teaches the laser module outlined in the rejection to claim 1, but does not teach the control apparatus to emit a control command to said adjustment apparatus to change the effective optical path length of said resonator by a predetermined fixed amount. Daiber teaches an external cavity laser utilizing a controller that uses data stored in a lookup table ([0045], wherein the data in the table is of a predetermined, fixed value). It would have been obvious to one of

ordinary skill at the time of the invention to combine the laser module of Zimmermann with the control function of Daiber in order to simplify calculations and load on a controlling processor.

Claims 29 and 32 are rejected for the same reasons as claims 1, 9, and 23. These claims merely detail the methods of process flow for the module. The method of process flow for a device is not germane to the patentability of the device itself, therefore these limitations are not given patentable weight. At best these claims could be characterized as product-by-process claims, where the process limitations are not limiting, only the structure implied by the process. See MPEP 2113. Here, the structure implied by the process steps is merely the structure of claims 1, 9, and 10.

Claims 19, 20, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann.

With respect to claim 19, Zimmerman teaches the use of single mode optical fiber (col.3 lines 11-17). Zimmermann does not teach the fiber to be made of glass. Glass fibers are very well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a fiber made of glass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

With respect to claim 20, Zimmermann teaches the use of an optical fiber with an antireflection-coated end (col.2 lines 36-39). Zimmermann does not teach the fiber to be

made of glass. Glass fibers are very well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a fiber made of glass, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

With respect to claim 26, Zimmermann teaches the method as outlined in the rejection to claim 25, but does not teach using the method continuously throughout the life of the device. It would have been obvious to one of ordinary skill in the art at the time of the invention to continue the monitoring and adjustment of the laser module (col.8 lines 61-64) for any desired length of time as is discussed in MPEP 2144.04 V e, In re Dilnot, 319 F.2d 188, 138 USPQ 248 (CCPA 1963).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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